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Survey of the Giant Gippsland Earthworm, *Megascolides australis* in areas potentially affected by a realignment of the South Gippsland Highway – Korumburra to Leongatha

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Abstract

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The Giant Gippsland Earthworm was not recorded in any of the sites examined within the proposed area of the South Gippsland Highway realignment from Korumburra to Leongatha. No specific mitigation measures are required in relation to the Giant Gippsland Earthworm.

Introduction

Museum Victoria was contracted by Vic Roads in October 2001 to provide advice on whether the Giant Gippsland Earthworm, *Megascolides australis* will be impacted by potential road works along the South Gippsland Highway between Korumburra and Leongatha. The Giant Gippsland Earthworm is listed as threatened under Victoria's *Flora and Fauna Guarantee Act* (1988). The species has been recorded within the Korumburra region (Smith and Peterson 1982, Van Praagh 1992, 1994).

Objectives. The aim of the project is to conduct a survey for the Giant Gippsland Earthworm in potential road project sites between Korumburra and Leongatha, South Gippsland. In addition, to provide advice on whether the Giant Gippsland Earthworm will be affected by road improvements and report on what actions can be undertaken to mitigate any affects on the species.

Project Outline. The specific tasks required of this project are:

- Provide advice on the presence of the Giant Gippsland Earthworm in the bands of interest based on active searches;
- Give locations of where the Giant Gippsland Earthworm is encountered in AMG coordinates;
- Provide an objective assessment of the potential impacts of the road realignment on any Giant Gippsland Earthworms recorded during the survey;
- Describe any opportunities to avoid or mitigate these potential impacts through design or management;
- Provision of an assessment of the likely resultant level of impacts if mitigation measures are adopted.

Giant Gippsland Earthworm

Significance of the Giant Gippsland Earthworm. The Giant Gippsland Earthworm, one of the largest earthworms in the world, has International, Commonwealth and State conservation significance. It is listed as Vulnerable by the International Union for the Conservation of Invertebrates (IUCN) (Wells *et al.* 1983) as well as under the Commonwealth Endangered Species Act. In Victoria it is listed as Vulnerable (CNR 1995) and Threatened (Flora and Fauna Guarantee Scientific Advisory Committee 1991). The species has also been listed on the register of the National Estate (Coy 1991) and is protected under Victoria's *Flora and Fauna Guarantee Act* (1988).

Distribution. The species is endemic to a relatively small area of approximately 40,000 ha of the Bass River Valley in South Gippsland, in a triangle roughly bounded by Loch, Korumburra and Warragul (Smith and Peterson 1982). The species can have a very localised distribution and is very patchy within its range. Sightings are regarded as uncommon and usually confined to within 40 m of stream banks, in particular smaller tributaries of the Bass River, soaks, and wet south facing hills.

Biology. Much of the biology of *M. australis* remains unknown, partly reflecting the difficulty in sampling a long lived and fragile subterranean animal. *M. australis* is an hermaphrodite with two individuals required for fertilisation. Breeding activity is evident by a large, swollen clitellum and occurs predominantly in spring and summer (Van Praagh 1996). Large amber coloured egg cocoons ranging in size from 5 to 9 cm are laid in chambers branching from the adult burrow at an average depth of 22 cm (Van Praagh 1994). Only one embryo is found in each egg cocoon, which is thought to take over 12 months to incubate. Although the life span of the species is unknown, field and laboratory studies suggest that it is very long lived, possibly taking up to 5 years to reach reproductive maturity. Field studies show the population consists predominantly of adults at all times of the year (Van Praagh 1994). This suggests a slow growth rate and population turnover, with a low rate of recruitment.

The worms live in complex, permanent burrows that extend to around 1 to 1.5 m in depth. Worms appear to remain underground, feeding on the root material and organic matter ingested in the soil. Occupied burrows are always wet, even in

summer, probably aiding the worm in movement and respiration. Worms can be locally abundant with a mean density of 2 per m^3 with up to 10 worms per m^3 recorded (Van Praagh 1992, 1994).

Threats to the Species. The Giant Gippsland Earthworm is one of the few species of native earthworms that has persisted in areas converted from native bush to pasture by surviving in pockets of suitable habitat where the affects of cultivation have been less severe (Van Praagh 1994, 1997).

The worm is a subsoil species, lives in a complex burrow system and rarely comes above the surface of the soil. Although the worm is somewhat buffered from environmental stress due to its depth in the soil profile, it exhibits particular life history characteristics which make it vulnerable. For example, the worm is long lived, has a slow growth rate, produces few young and has a poor dispersal ability (Van Praagh 1992, 1994, 1997). These characteristics mean that populations have little ability to recover from any damage since population turnover is so slow. Individuals are extremely fragile and even slight bruising or damage may result in death. The major threats to the species include disturbances to its soil habitat (physical and chemical), soil erosion, compaction, and, in particular, changes to the water table and altered drainage patterns.

Study Area

South Gippsland Highway – Realignment Korumburra to Leongatha between 117.4km and 130.0km.

The study area comprises an area of approximately 12.6 km east of Korumburra to the township of Leongatha consisting primarily of pasture in Crown land and freehold land.

Methodology

To establish the presence of the Giant Gippsland Earthworm along the routes of the proposed road improvements, a survey of the site was undertaken. This involved:

Identification of suitable habitat. The entire length of the route of the proposed road realignment was assessed to identify areas of suitable earthworm habitat. While precise habitat parameters for the species are unknown, several factors that characterise suitable habitat have been identified (Smith and Peterson 1982, Van Praagh 1994). These include proximity to water, soil moisture and soil type. The earthworm is usually associated with creek banks, in particular smaller tributaries of the Bass River, soaks or wet south facing slopes but is generally absent from areas where there is a high level of waterlogging and compaction. Areas of higher underground water content or seepages can often be observed due to greener patches of pasture often presenting as soaks and areas that have pronounced terracettes (Van Praagh *et al.* 2001). These areas were targeted for earthworm sampling.

Detailed surveying of suitable earthworm habitat. Sites identified as suitable habitat within or near the bands of interest were surveyed to establish the presence of the earthworms. The most reliable way of locating the earthworm is by digging and looking for earthworm burrows. This involves digging quadrats of approximately 50 cm x 50 cm to examine the soil for burrows. A wet burrow indicates that the burrow is actively being utilised by a worm. Earthworms can also be detected by a gurgling sound that is made when worms retreat down their wet burrows. Thus presence of the worms can also be established by banging the ground with a spade and listening for gurgles, particularly if the ground is wet.

All records of the Giant Gippsland Earthworm were recorded using AMG/Lat, Long coordinates.

A field survey for the Giant Gippsland Earthworm was conducted over several days in January and February 2002.

Limitations of study.Due to the large survey area involved, sites of suitable habitat were targeted for sampling. While every effort was made to identify these sites, it is possible that some sites were missed during the survey.

Results

The Giant Gippsland Earthworm was not recorded in any of the sites examined within the proposed area of highway realignment from Korumburra to Leongatha.

Discussion

The NRE Wildlife Atlas database and records by Van Praagh (1994) indicate that the township of Korumburra represents the most south-easterly known distribution of the Giant Gippsland Earthworm (Figure 1). The closest known records to the study area are from the Korumburra Golf Course and Caravan Park, about 1 km north east of the township. Thus it would be expected that the closer to Leongatha, the less likely suitable earthworm habitat would be found. It is therefore not surprising that no sightings of *M. australis* were made during the current survey, although the area just east of Korumburra represents potential habitat.

It is not certain whether the study area represents unsuitable habitat for the species or whether other factors such as limited dispersal ability and geographical barriers prevent the worms from moving outside their known range. It is certainly obvious that about 6- 7km east of Korumburra, the vegetation changes from predominantly Blue Gums to Messmates and Stringy Barks. According to Sargeant (pers. comm. 2002) this change in vegetation is accompanied by a change in soil profile. Soils past this point tend to have a more marked transition between the topsoil and the subsoil and the topography is more subdued. Also the sandier Tertiary sediments cut in towards Leongatha. A similar change in soil characteristics marks the western boundary of the worm distribution (just west of the Bass River). Many species of earthworms have difficulty tolerating the more sandy soil. Soil texture has been found to be an important factor in governing distribution of many earthworm species (McKenzie and Dyne 1991) and soil analyses by Van Praagh (1994) indicated that *M. australis* was absent in soils with a high coarse sand content. *M. australis* appears to be mainly confined to hilly areas where Blue Gums dominate the landscape.

A previous study by (Van Praagh *et al.* 2002) noted a possible relationship between the prevalence of landslips in the south to south –easterly facing slopes of the hilly country and the associated presence of surplus subsoil water and Giant Gippsland Earthworm distribution. The flatter topography east of Korumburra may not yield enough surplus subsoil water to create the conditions for *M. australis* to survive.

Implications of road construction. Possible improvements to the South Gippsland Highway from Korumburra to Leongatha could involve major physical disturbance to the soil resulting from large scale soil excavation, removal of rock and soil by machine extraction, compaction and altered soil hydrology.

Potential Impacts on **M. australis**. None

Mitigation Measures. No mitigation measures in relation to the Giant Gippsland Earthworm are required.

Recommendations. Major recommendations regarding protection of the Giant Gippsland Earthworm within the area specified as potential areas for roadworks between Korumburra and Leongatha are not required. However, while every effort was made to sample the specified area for populations of the Giant Gippsland Earthworm, it is always possible that a population may have been missed. In the event that this situation arises the following is recommended:

1 Notify Museum Victoria of any Giant Gippsland Earthworms unearthed / exposed during construction. Record the number and location of all Giant Gippsland Earthworms unearthed / exposed.

2 All unharmed Giant Gippsland Earthworms unearthed / exposed during construction should be promptly relocated to a nearby area which will not be impacted upon by the works. Worms shall be placed in a shallow hole and covered with loose moist soil.

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Figure 1. Victorian Wildlife Atlas showing distribution of Giant Gippsland Earthworm. (From Department of Natural Resources and Environment). Note not all records verified.